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Environmental cues that affect knowing: A case study in a public hospital building

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Abstract

Hospital buildings can be described as sophisticated public areas due to their functional organizations' complexity and architectural configuration. Although these buildings generally cover all the functional requirements, quite often they are not able to face the psychological needs of patients and their companions. The research which is presented in this article focuses on the "perceptive memories" of companions, during their visits in the hospital. The main aim of the study is to describe the "visual characteristics" of the environment that helps the users to "know" the building and affect the "legibility". The case study was carried out in one of the largest public hospitals in Istanbul, the CAPA Clinical Faculty, which has a distinctive architectural form. The symmetrical plans of the building provided an opportunity to compare data gathered from the different departments of the hospital which have very similar configurations but different wall colours, signage systems, functions, lighting design, floor coverings and landmarks. 41 participants were engaged in a questionnaire task, which contained open-ended questions, and photographs taken from similar points and presented the same perspectives that were chosen on purpose. The participants were asked to choose their departments from the picture boards and explain the reason for their choice by describing the physical characteristics of the environment. In the literature, these mentioned points are called "choice points", places where people get information from the environment and make decisions about their movements. As a result of the study, the analysis of the data provided support that people need environmental cues for describing and knowing their environment. The results essentially present the fact that legibility decreases in conditions in which there are fewer environmental cues. The research also suggests that the time spent in the hospital plays a significant role in the task performance. People who spent more time in the hospital tended to use different descriptive words from others. One of the most significant purposes of architectural design is to create environments in which users are psychologically satisfied with the human-environment interaction system. It is essential that the organization of the physical environment satisfies peoples' psychological needs, particularly in public places such as hospital buildings, where people don't have time and energy to waste.

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Key Words: psychological needs, perceptive memory, legibility, experiencing hospitals

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1. Introduction

Our perceptions of the physical world, the distinctions we make about it, and the significant factors affecting our awareness of space are important issues for researchers who try to clarify the relationship between environment and behaviour.

The developing field of environmental design presents a growing belief that a physical environment profoundly influences a psychological state and social behaviour. Sanoff (2006a) suggested that knowledge of man's visual comprehension of his physical environment is primarily the responsibility of environmental psychology, a science that may be defined as the psychological study of behaviour as it relates to the everyday physical environment. Nowadays, people spend their time mostly in manmade environments rather than natural environments. Therefore, buildings serve as laboratories that give us an opportunity to examine the perception of the physical environment in the scope of the environment and behaviour.

Large built environments, such as transportation centres, hospitals, and governmental facilities, are extremely complex and maze-like due to great numbers of hallways and choice points (O'Neill, 1991). There is a growing body of literature about the way in which people explore, learn, and find their way around these large scale environments (Peponis *et al.*, 1990). Particularly in hospital buildings where people don't have time and energy to waste, the organization of facilities and design of the interior environment becomes essential. Hospital buildings can be described as sophisticated public areas due to their functional organizations' complexity and architectural configuration. Although these buildings generally cover all the functional requirements, quite often they are not able to face the psychological needs of patients and their companions. The study aims to describe the "visual characteristics" of the hospital environment that help the users to "know" the buildings and affect the "legibility".

2. Environmental cues that affect knowing

Man perceives the visual world and responds to it through the areas of his potentialities that have been made functional by environmental stimulation (Sanoff, 2006a). The built environment is continuously transmitting messages to people. These messages convey cues for behaviour which people are able to read and understand (Sanoff, 1991). People read environmental cues, make judgments and act accordingly. Theory suggests that people store the salient physical characteristics of the environment in a mental representation (Kaplan & Kaplan, 1982; Tolman, 1948). Lynch (1960) thought that distinct landmarks and other physical characteristics could affect the legibility of an environment. Ittelson (1960) identified the three basic components of the perceptual process of defining "thereness and thatness" as impingement by the physical object, the excitation of the physiological sensors, and assumption in the psychological realm. Regarding the simple discrimination of elements in the visual field, people rely on the interaction of characteristics or cues such as size, shape, colour, brightness, position in the field, overly, linear and aerial perspective, light and shade, accommodation and convergence (Sanoff, 1991). Hospitals, as well as the other environments, contain visual cues that help us to know the environment, move through it and perform effectively. The case study presented here tries to explain the descriptive characteristics of hospital environments by eliminating plan complexity. Dissimilar settings in hospitals with the same plan configuration were chosen as case study areas. This method gave the opportunity to describe the visual cues of different hospital settings without sticking to a plan configuration.

3. Design of the research (method)

3.1. Case selection

The case study was carried out in one of the largest public hospitals in Istanbul, the CAPA Clinical Faculty, which has a distinctive architectural form. The symmetrical plans of the building (Figure 1) provided an opportunity to compare different settings related with their physical characteristics.

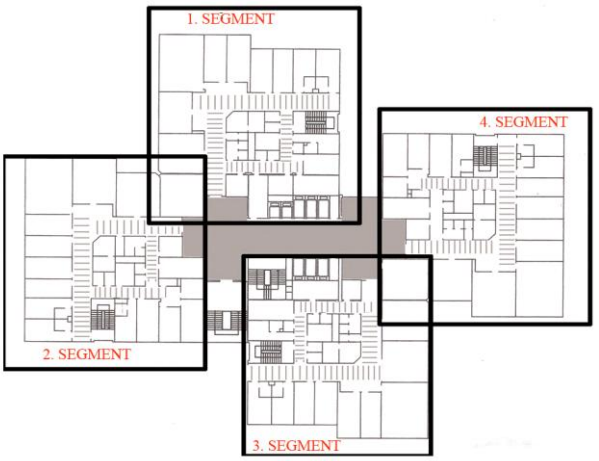

Figure 1. Plan organization of "Capa Clinical Faculty"

The study was carried out on the 3rd, 4th and 5th floors, which are 2,640 m2 each. Every floor consists of four parts which are symmetrical but have different wall colours, signage systems, functions, lighting design, floor coverings and landmarks. Being symmetrical in plan configuration gave us the opportunity to compare the visual characteristics of every setting by eliminating the concept of plan configuration. Nine photographs were taken from points (Figure 2) that identified three settings. Photographs were taken from points that were delineated previously by Haq and Zimring (2001) as "choice points". Choice points are nodes, which are generally the intersections of corridors, and places that people get environmental information and aid decisions about where to go.

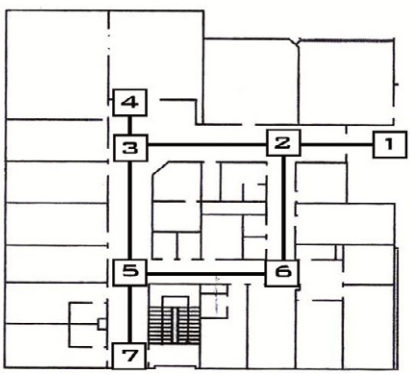

Figure 2. Plan organization and "choice points" of one department

3.2. Survey instrument

41 participants were engaged in a questionnaire task, which contained open-ended questions and photographs taken from similar points, with the same scale, and which presented the same perspectives that were chosen on purpose. The participants were then asked to choose their departments from the picture clipboards at a size of 25 cm x 100 cm (Figure 3) and explain the reason for their choice by describing the physical characteristics of the environment. A similar photographic approach was used by Sanoff in exhibition areas so as to compare environmental characteristics (Sanoff, 1991). Parallel research done by Eroglu and Machleit (1990) used a laboratory experimentation task using colour slides to understand the effect of crowding on behaviour. According to Baker and Grewal (1992), using such a representation of the environment may be more convenient to implement than an actual environment. Referring to this statement, our research used the photography technique to simulate the settings in hospital, so as to provide commeasurable situations for the scenarios predefined in the questionnaire.

Figure 3. Clipboards prepared for the questionnaire showing three choice points

A questionnaire was designed to collect the data of the visual preferences of different settings. Two main questions were asked of the participants. Firstly, for each choice point, participants were asked to choose the setting that they were currently in, and mark the environmental characteristics that help them to describe the setting. The aim of this question was to evaluate the physical characteristics of settings which help participants to know the setting. The second question was ‘How long have you been in this department?’. This data helped us to rate the efficacy of “time spent in hospital” related to recalling the hospital setting.

3.3. Data collection procedure

The case study involved 41 participants aged between 40 and 60, and 10 of them were men. 15 seconds was given to each of the volunteers to choose the settings they were currently in. The name of the place which each setting belonged to was written behind the clipboards. Assistants took a record of the choices and wrote down the personal characteristics of the participants.

4. Data analysis

The first step of the research evaluates the participants' experimentation of the hospital. Therefore, two main groups were defined related to their "length of stay in hospital" (Table 1). In the second stage, participants were asked to point out their department and explain the reason for their choice by describing the physical characteristics of the setting.

Table 1. Definition of two groups

Group	Time Spent in Hospital	Number of Persons
A	One day	24
B	More than three days	17

Total Number: 41

Table 2 shows the rate of right answers. The data revealed that people who have spent more time in hospital tend to be more successful in choosing the right setting. The data also showed that each choice point had a different rate of being known. The first choice point had a higher rate of being known (80.5%).

Table 2. The rate of right answers

		1. Choice Point		2. Choice Point		3. Choice Point	
	No	No	%	No	%	No	%
Group	Answers	Wright Answers	Wright Answers	Wright Answers	Wright Answers	Wright Answers	Wright Answers
A	24	19	79.2	14	58.3	12	50
B	17	14	82.4	11	64.7	9	52.9
A+B	41	33	80.5	25	61.0	21	51.2

The descriptive words used by participants were grouped by three colleagues who were 90% in agreement with their choices (Table 3). These descriptive words were significant to discover the physical characteristics of each setting that help people "know the building". A similar adjective grouping technique was used previously by Sanoff (2006b) to understand the students' responses to schools, and by Sommer *et al.* (1981) to evaluate peoples' attitudes to shopping environments.

Table 3. Grouping criteria

Consept	Contex
Wayfinding	Orientation (right and left positioning)
Colour	Wall colour, Floor colour
Signage system	Entrence, Exit, Fire exit
Function	Wc, Recreation room, Waiting room
Form	Shape of the desk, Shape of the doors,
Lighting	Lighting system
Pavement	Dimensions of floor covering, Charecter of floor covering
Landmark	Pot plant, Portrait of Ataturk, Fire chest, Dresser

Table 4 and Table 5 show that each group of participants used different environmental characteristics to describe the settings.

Table 4. Distribution of answers of group A

	1.Choice point		2.Choice point		3.Choice point	
Consept	No	%	No	%	No	%
Wayfinding	3,0	15,8	2,0	14,3	3,0	25,0
Colour	3,0	15,8	6,0	42,9	1,0	8,3
Signage system	1,0	5,3	_	0,0	_	0,0
Function	_	0,0	_	0,0	_	0,0
Form	10,0	52,6	_	0,0	1,0	8,3
Lighting	_	0,0	1,0	7,1	_	0,0
Pavement	_	0,0	2,0	14,3	2,0	16,7
Landmark	2,0	10,5	3,0	21,4	5,0	41,7

Table 5. Distribution of answers of group B

	1.Choice point		2.Choice point		3.Choice point	
Consept	No	%	No	%	No	%
Wayfinding	_	0,0	_	0,0	1,0	11,1
Colour	2,0	14,3	2,0	18,2	_	0,0
Signage system	1,0	7,1	1,0	9,1	_	0,0
Function	_	0,0	_	0,0	2,0	22,2
Form	8,0	57,1	_	0,0	_	0,0
Lighting	1,0	7,1	3,0	27,3	2,0	22,2
Pavement	_	0,0	1,0	9,1	2,0	22,2
Landmark	2,0	14,3	4,0	36,4	2,0	22,2

5. Results and discussion

People who spent more time in the hospital tended to use different descriptive words from others. Participants who spent more time in hospital (group B) tended to be more successful at remembering their own setting. So, time was a significant factor in knowing the setting. As was expected, environmental cues affect the legibility of participants. It was clear that each setting has different characteristics that help people to know the setting. The majority of participants (80.5%) chose the proper setting among pictures identifying choice point one (Table 6). Almost two-thirds of participants (61%) were able to identify choice point two. Choice point three was correctly identified by half of the participants (51.2%). It is suggested that one choice point contains many environmental cues that help people to know the setting and choose the correct picture. The distinct shape of the “information desk” and the location of a portrait of Ataturk helped people to remember the setting. The third choice point seemed to be the setting with the least distinctly legible characteristics; thus, this choice point was recognized the least. The narrow corridor gave little clues about the setting and made it difficult to distinguish the true setting.

Table 6. Right answers given for each setting

	1. Choice point	2. Choice point	3. Choice point
%	80,5	61	51,2

Both groups of participants used different environmental characteristics to describe the settings. While the way finding concept was significant for group A, it was not a determinant for group B. However, group B tended to recognize settings by mostly concentrating on landmarks like portraits, doors, and the shape of the information desk.

Group A, which included the new arrivals to the hospital, paid more attention to the spatial configuration, symmetry and general organization in their efforts to identify a place. Group B paid attention to the details when describing the places because of the fact that they had spent more time at the hospital, while the newcomers were striving on "being oriented" and "identify the place".

The results show that the legibility decreases in conditions where there are fewer environmental cues. The research also suggests that the time spent in the hospital plays a significant role in the task performance.

One of the most significant purposes of architectural design is to create environments which users are psychologically satisfied with in terms of the human-environment interaction system. Designers must spend more time understanding users' psychological needs, especially in hospital buildings where people don't have time and energy to waste. Creating legible and characteristic environments helps people to orient themselves and enables them to make easier decisions during their activities in hospitals.

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